

What is claimed is:

1. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

5       a rotation position detection means for detecting a rotation position of the rotatory optical deflector at a position corresponding to a reading start edge of a laser beam scanning range of a bar code;

10       a means for starting bar code reading by rotating the rotatory optical deflector again after stopping rotation of the rotatory optical deflector for only a predetermined time length upon the rotation position detection means detecting the rotation position of the rotatory optical deflector; and

15       a means for stopping the rotation of the rotatory optical deflector for only a predetermined time length upon a laser beam scanning time length reaching a preset scanning time length up to the final position of the bar code reading after the bar code reading is started by the means for starting the bar code reading.

2. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

20       a rotation position detection means for detecting a rotation position of the rotatory optical deflector at a position before a reading start edge of a laser beam scanning range of a bar code;

25       a means for starting bar code reading by rotating the rotatory optical deflector again after stopping rotation of the rotatory optical deflector for only a predetermined time length upon a laser beam scanning time length reaching a preset scanning time length up to a reading start position after the rotation position detection means detecting the rotation position of the

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rotatory optical deflector; and

a means for stopping the rotation of the rotatory optical deflector for only a predetermined time length upon a laser beam scanning time length reaching a preset scanning time length up to the final position of the bar code reading after the bar code reading is started by the means for starting the bar code reading.

3. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

a means for selecting either automatic scanning or manual scanning;  
a rotation position detection means for detecting a rotation position of the rotatory optical deflector at a position corresponding to a reading start edge of a laser beam scanning range of a bar code;

a means comprising a function of starting bar code reading by rotating the rotatory optical deflector again after stopping rotation of the rotatory optical deflector for only a predetermined time length upon the rotation position detection means detecting the rotation position of the rotatory optical deflector in a case of the automatic scanning being selected, and a function of subsequently stopping the rotation of the rotatory optical deflector for only a predetermined time length upon a laser beam scanning time length reaching a preset scanning time length up to the final position of the bar code reading; and

a means for stopping rotation of the rotatory optical deflector through locking upon the laser beam scanning time length reaching a preset scanning time length up to the center position of the laser beam scanning range of the bar code after the rotation position detection means detecting the rotation position of the rotatory optical deflector in a case of

the manual scanning being selected.

4. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

5           a means for selecting either automatic scanning or manual scanning;  
             a rotation position detection means for detecting a rotation position of the rotatory optical deflector at a position corresponding to a reading start edge of a laser beam scanning range of a bar code;

10           a means comprising a function of stopping rotation of the rotatory optical deflector for only a predetermined time length upon a laser beam scanning time length reaching a preset scanning time length up to a reading start position of the bar code reading after the rotation position detection means detecting the rotation position of the rotatory optical deflector in a case of the automatic scanning being selected, and a function of  
 15           subsequently starting bar code reading by rotating the rotatory optical deflector again and stopping rotation of the rotatory optical deflector for only a predetermined time length upon the laser beam scanning time length reaching a preset scanning time length up to the final reading position of the bar code reading; and

20           a means for stopping rotation of the rotatory optical deflector through locking upon the laser beam scanning time length reaching a preset scanning time length up to the center position of the laser beam scanning range of the bar code after the rotation position detection means detecting the rotation position of the rotatory optical deflector in a case of  
 25           the manual scanning being selected.

5. A bar code reader according to claim 1, further comprising a means for setting the scanning time length up to the final position of the

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bar code reading.

6. A bar code reader according to claim 1, further comprising a means for setting the predetermined time length during which rotation of the rotatory optical deflector is stopped.

5        7. A bar code reader according to claim 1, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicator, disposed in vicinity of a passage of the sensing indicator.

10       8. A bar code reader according to claim 2, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicator, disposed in vicinity of a passage of the sensing indicator.

15       9. A bar code reader according to claim 3, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicator, disposed in vicinity of a passage of the sensing indicator.

20       10. A bar code reader according to claim 4, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicator, disposed in vicinity of a passage of the sensing indicator.

25       11. A bar code reader according to claim 7, wherein the sensing indicator is a strip provided such that it protrudes from the underside face of the rotatory optical deflector.

09867710-100101

12. A bar code reader according to claim 8, wherein the sensing indicator is a strip provided such that it protrudes from the underside face of the rotatory optical deflector.

5 13. A bar code reader according to claim 9, wherein the sensing indicator is a strip provided such that it protrudes from the underside face of the rotatory optical deflector.

14. A bar code reader according to claim 10, wherein the sensing indicator is a strip provided such that it protrudes from the underside face of the rotatory optical deflector.

10 15. A bar code reader according to claim 7, wherein the sensing indicator is a coated stripe formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

15 16. A bar code reader according to claim 8, wherein the sensing indicator is a coated stripe formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

20 17. A bar code reader according to claim 9, wherein the sensing indicator is a coated stripe formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

25 18. A bar code reader according to claim 10, wherein the sensing indicator is a coated stripe formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

19. A bar code reader according to claim 7, wherein the sensing indicator is a slit formed on a plate for detection, attached to the rotatory

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optical deflector.

20. A bar code reader according to claim 8, wherein the sensing indicator is a slit formed on a plate for detection, attached to the rotatory optical deflector.

5        21. A bar code reader according to claim 9, wherein the sensing indicator is a slit formed on a plate for detection, attached to the rotatory optical deflector.

10        22. A bar code reader according to claim 10, wherein the sensing indicator is a slit formed on a plate for detection, attached to the rotatory optical deflector.

23. A bar code reader provided with a laser diode, a collimator lens for rendering laser light emitted by the laser diode into a laser beam of parallel light rays, and a rotatory optical deflector for deflecting the laser beam for scanning,

15        wherein a first fixed optical deflector is disposed in front of the collimator lens in the outgoing direction of the laser beam such that a laser beam deflected by the first fixed optical deflector is rotationally deflected by the rotatory optical deflector so as to scan a bar code, and

20        a second fixed optical deflector is provided so as to deflect a laser beam deflected by the first fixed optical deflector in a given direction when the rotatory optical deflector is situated in a rotation position outside an optical path of the laser beam.

25        24. A bar code reader according to claim 23, wherein the second fixed optical deflector is disposed on an opposite side from the first fixed optical deflector with respect to the rotatory optical deflector.

25. A bar code reader according to claim 23, wherein the second fixed optical deflector is made up of a translucent reflector so as to reflect

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a portion of the laser beam falling on the second fixed optical deflector to be deflected in the given direction, allowing the rest of the laser beam to be transmitted therethrough, and a third fixed optical deflector is provided so as to deflect a transmitted portion of the laser beam in a direction differing from the given direction.

26. A bar code reader according to claim 25, wherein the second fixed optical deflector is disposed on an opposite side from the first fixed optical deflector with respect to the rotatory optical deflector, and the third fixed optical deflector is disposed further behind the second fixed optical deflector.

27. A bar code reader according to claim 23, further comprising a rotation position detection means for detecting a rotation position of the rotatory optical deflector, and a temporary rotation stoppage means for stopping rotation of the rotatory optical deflector for only a predetermined time length when it is decided on the basis of a detection result of the rotation position detection means that the rotatory optical deflector is situated in a rotation position outside an optical path of the laser beam deflected by the first fixed optical deflector.

28. A bar code reader according to claim 25, further comprising a rotation position detection means for detecting a rotation position of the rotatory optical deflector, and a temporary rotation stoppage means for stopping rotation of the rotatory optical deflector for only a predetermined time length when it is decided on the basis of a detection result of the rotation position detection means that the rotatory optical deflector is situated in a rotation position outside an optical path of the laser beam deflected by the first fixed optical deflector.

29. A bar code reader according to claim 27, wherein the temporary

rotation stoppage means is a means for stopping the rotation of the rotatory optical deflector for only the predetermined time length upon deciding that the rotatory optical deflector is situated in a rotation position outside the optical path of the laser beam deflected by the first fixed optical deflector by taking measurement of an elapsed time after the rotation position detection means detecting the rotation position of the rotatory optical deflector and upon the elapse of a predetermined time length.

30. A bar code reader according to claim 28, wherein the temporary rotation stoppage means is a means for stopping the rotation of the rotatory optical deflector for only the predetermined time length upon deciding that the rotatory optical deflector is situated in a rotation position outside the optical path of the laser beam deflected by the first fixed optical deflector by taking measurement of an elapsed time after the rotation position detection means detecting the rotation position of the rotatory optical deflector and upon the elapse of a predetermined time length.

31. A bar code reader according to claim 27, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicators, disposed in vicinity of passage of the sensing indicator.

32. A bar code reader according to claim 28, wherein the rotation position detection means is comprised of a sensing indicator provided on the rotatory optical deflector, and a reflection type photosensor for sensing the sensing indicators, disposed in vicinity of passage of the sensing indicator.

33. A bar code reader according to claim 31, wherein the sensing indicator is a strip provided such that it protrudes from the underside face

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of the rotatory optical deflector.

34. A bar code reader according to claim 32, wherein the sensing indicator is a strip provided such that it protrudes from the underside face of the rotatory optical deflector.

5 35. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

a means for selecting either automatic scanning or manual scanning;

10 a rotation position detection means for detecting a rotation position of the rotatory optical deflector at two spots corresponding to opposite edges of a laser beam scanning range of a bar code, respectively, and at a spot situated between the two spots; and

15 a means comprising a function of stopping rotation of the rotatory optical deflector for only a predetermined time length upon the rotation position detection means detecting the rotation position of the rotatory optical deflector at the two spots, respectively, in a case of the automatic scanning being selected, and a function of stopping the rotation of the rotatory optical deflector through locking upon the rotation position detection means detecting the rotation position of the rotatory optical  
20 deflector at the spot situated between the two spots in a case of the manual scanning being selected.

36. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

25 a means for selecting either automatic scanning or manual scanning;

a rotation position detection means for detecting a rotation position of the rotatory optical deflector at two spots corresponding to the opposite

edges of a laser beam scanning range of a bar code, respectively, and at a spot situated between the two spots; and

a means comprising a function of slowing down a rotation speed of the rotatory optical deflector during a period of bar code reading from a time of the rotation position detection means detecting one of the rotation positions at the two spots up to the rotation position detection means detecting the other of the rotation positions while rotating the rotatory optical deflector at a higher speed in other periods, in a case of the automatic scanning being selected, and a function of stopping the rotation of the rotatory optical deflector through locking upon the rotation position detection means detecting the rotation position of the rotatory optical deflector at the spot situated between the two spots in a case of the manual scanning being selected.

37. A bar code reader according to claim 35, wherein the rotation position detection means of detecting the rotation position of the rotatory optical deflector at the two spots corresponding to the opposite edges of the laser beam scanning range of the bar code, and at the spot situated between the two spots, respectively, are comprised of three sensing indicators provided at predetermined intervals in a direction of rotation of the rotatory optical deflector, and a reflection type photosensor for sensing the three sensing indicators, disposed in vicinity of passages of the three sensing indicators.

38. A bar code reader according to claim 36, wherein the rotation position detection means of detecting the rotation position of the rotatory optical deflector at the two spots corresponding to the opposite edges of the laser beam scanning range of the bar code, and at the spot situated between the two spots, respectively, are comprised of three sensing

indicators provided at predetermined intervals in a direction of rotation of the rotatory optical deflector, and a reflection type photosensor for sensing the three sensing indicators, disposed in vicinity of passages of the three sensing indicators.

5           39. A bar code reader according to claim 37, wherein the three sensing indicators are provided on the rotatory optical deflector, radially from a center of rotation thereof at a predetermined angular interval, respectively.

10           40. A bar code reader according to claim 38, wherein the three sensing indicators are provided on the rotatory optical deflector, radially from a center of rotation thereof at a predetermined angular interval, respectively.

15           41. A bar code reader according to claim 37, wherein the three sensing indicators are strips provided such that they protrude from an underside face of the rotatory optical deflector.

          42. A bar code reader according to claim 38, wherein the three sensing indicators are strips provided such that they protrude from an underside face of the rotatory optical deflector.

20           43. A bar code reader according to claim 37, wherein the three sensing indicators are coated stripes formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of an underside face.

25           44. A bar code reader according to claim 38, wherein the three sensing indicators are coated stripes formed on the underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of an underside face.

          45. A bar code reader according to claim 37, wherein the three

sensing indicators are slits formed on a plate for detection, attached to the rotatory optical deflector.

5 46. A bar code reader according to claim 38, wherein the three sensing indicators are slits formed on a plate for detection, attached to the rotatory optical deflector.

47. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

10 a means for detecting rotation position of the rotatory optical deflector at two spots corresponding to opposite edges of a laser beam scanning range of a bar code, respectively; and

15 a means for stopping rotation of the rotatory optical deflector for only a predetermined time length upon the means for detecting rotation position detecting the rotation position of the rotatory optical deflector at the two spots, respectively;

48. A bar code reader provided with a laser diode and a rotatory optical deflector for deflecting a laser beam emitted by the laser diode for scanning, said bar code reader comprising:

20 a means for detecting rotation position of the rotatory optical deflector at two spots corresponding to opposite edges of a laser beam scanning range of a bar code, respectively; and

25 a means for reducing a rotation speed of the rotatory optical deflector during a time period from a time of the means for detecting rotation position detecting a rotation position of the rotatory optical deflector corresponding to a scanning start edge, up to a time of the means for detecting rotation position detecting a rotation position of the rotatory optical deflector corresponding to a scanning completion edge, from a

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rotation speed in other periods.

49. A bar code reader according to claim 47, wherein the means for detecting rotation position of the rotatory optical deflector at the two spots corresponding to the opposite edges of the laser beam scanning range of the bar code is comprised of a pair of sensing indicators provided at a predetermined interval in the direction of rotation of the rotatory optical deflector, and a reflection type photosensor for sensing the pair of sensing indicators, disposed in vicinity of passages of the pair of the sensing indicators.

50. A bar code reader according to claim 48, wherein the means for detecting rotation position of the rotatory optical deflector at the two spots corresponding to the opposite edges of the laser beam scanning range of the bar code is comprised of a pair of sensing indicators provided at a predetermined interval in the direction of rotation of the rotatory optical deflector, and a reflection type photosensor for sensing the pair of sensing indicators, disposed in vicinity of passages of the pair of the sensing indicators.

51. A bar code reader according to claim 49, wherein the pair of the sensing indicators are provided on the rotatory optical deflector, radially from a center of rotation thereof at a predetermined angular interval.

52. A bar code reader according to claim 50, wherein the pair of the sensing indicators are provided on the rotatory optical deflector, radially from a center of rotation thereof at a predetermined angular interval.

53. A bar code reader according to claim 49, wherein the pair of the sensing indicators are a pair of strips provided such that they protrude from an underside face of the rotatory optical deflector.

54. A bar code reader according to claim 50, wherein the pair of the

sensing indicators are a pair of strips provided such that they protrude from an underside face of the rotatory optical deflector.

5 55. A bar code reader according to claim 49, wherein the pair of the sensing indicators are a pair of coated stripes formed on an underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

10 56. A bar code reader according to claim 50, wherein the pair of the sensing indicators are a pair of coated stripes formed on an underside face of the rotatory optical deflector by printing or painting with ink or paint, having reflectance differing from that of the underside face.

57. A bar code reader according to claim 49, wherein the pair of the sensing indicators are a pair of slits formed on a plate for detection, attached to the rotatory optical deflector.

15 58. A bar code reader according to claim 50, wherein the pair of the sensing indicators are a pair of slits formed on a plate for detection, attached to the rotatory optical deflector.

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